Claims:

1. A radiation imaging device, comprising:

a subject radiation station producing photon emissions; and

a scintillation crystal detection array arranged to receive emissions from said subject radiation station, the scintillation crystal detection array having a plurality of crystal sheets and intervening semiconductor photodetector positional detectors, the semiconductor photodetector positional detectors having semiconductor photodetectors reading light from a large face of a corresponding crystal sheet.

2. The device of claim 1, wherein said scintillation crystal detection array arranged to receive the emissions in a direction generally orthogonal to large faces of said crystal sheets.

3. The device of claim 2, wherein said intervening semiconductor photodetector positional detectors comprise photodetector line arrays.

4. The device of claim 3, wherein alternating ones of said intervening semiconductor photodetector positional detectors are oriented to form a cross grid arrangement of the photodetector line arrays.

5. The device of claim 2, wherein said intervening semiconductor photodetector positional detectors comprise segmented photodetector line arrays.

6. The device of claim 2, wherein said intervening semiconductor photodetector positional detectors each comprises a position sensitive photodetector.

7. The device of claim 1, wherein said scintillation crystal detection array is arranged to receive the emissions by end faces of said crystal sheets in a direction generally parallel to large faces of said crystal sheets.

8. The device of claim 7, wherein said intervening semiconductor photodetector positional detectors comprise photodetector line arrays.

9. The device of claim 8, wherein alternating ones of said intervening semiconductor arrays are oriented to form a cross grid arrangement of the photodetector line arrays.

10. The device of claim 7, wherein said intervening semiconductor photodetector positional detectors comprise segmented photodetector line arrays.

11. The device of claim 7, wherein said intervening semiconductor photodetector positional detectors each comprises a position sensitive photodetector.

12. The device of claim 7, wherein said intervening semiconductor photodetector positional detectors have a thickness of $\leq 300\mu m$.

13. The device of claim 12, wherein said intervening semiconductor photodetector positional detectors comprise semiconductor photodetectors supported by one of said plurality of said crystal sheets, said crystal sheets forming a substrate.

14. The method of claim 12, wherein said intervening semiconductor photodetectors are each supported by a substrate.

15. The device of claim 1, wherein said intervening semiconductor photodetector positional detectors comprise semiconductor photodetectors supported by one of said plurality of said crystal sheets, said crystal sheets forming a substrate.

16. The method of claim 1, wherein said intervening semiconductor photodetectors are each supported by a substrate.

17. The device of claim 1, wherein said plurality of crystal sheets and said intervening semiconductor photodetector positional detectors are arranged in a ring.

18. The device of claim 1, said scintillation crystal detection array forming one of a plurality of scintillation crystal detection arrays, each forming one of a plurality of modules.

19. The device of claim 18, wherein said modules are arranged in a linear mosaic.

20. The device of claim 18, wherein said modules are arranged in a ring.

21. The device of claim 20, said ring comprising one of a plurality of rings to form a cylinder, with leads from said scintillation crystal detection arrays extending from an outer circumference of said cylinder.

22. A radiation imaging device, comprising:

scintillation crystal sheets arranged in parallel to each other;

semiconductor photodetector positional detectors reading light from large faces of said scintillation crystal sheets to detect interactions in said scintillation

crystal sheets and independently provide positional information concerning the interactions relative to at least one axis.

23. The device of claim 22, wherein said semiconductor photodetector positional detectors have a thickness of ≤300μm.

24. The device of claim 22, wherein alternating ones of said semiconductor photodetector positional detectors are oriented to form a cross grid arrangement.

25. The device of claim 22, wherein said semiconductor photodetector positional detectors comprise semiconductor photodetectors supported by ones of said scintillation crystal sheets, said scintillation crystal sheets each forming a substrate.

26. The device of claim 22, wherein said semiconductor arrays comprise semiconductor photodetectors supported by a substrate.

27. The device of claim 22, said semiconductor photodetector positional detectors being arranged to independently provide positional information relative to both an X and Y axis for interactions detected in said crystal sheets.

28. The method of claim 22, wherein said semiconductor photodetector positional detectors are formed directly on corresponding large faces of said scintillation crystal sheets.